ARMORED MEDICAL RESEARCH LABORATORY

FORT KNOX, KENTUCKY

Final Report On

PROJECT NO. 45 - Operational and Physiological Characteristics of the Tank T26E3, (M26)

SUBJECT: STUDY OF THE PROPOSED RELOCATION OF THE 1000 CFM TANK VENTILATING BLOWER TO THE TURRET BULGE

INFORMATION COPY

Action copies have been forwarded to Requirements Section, AGF for approval and execution.

Project No. 45

31 July 1945

ARMORED MEDICAL RESEARCH LABORATORY
Fort Knox, Kentucky

Project No. 45
SPMEA 724-41

31 July 1945

1. PROJECT: No. 45, Operational and Physiological Characteristics of the Tank T26E3, (M26), Final Report. Subject: Study of the Proposed Relocation of the 1000 cfm Tank Ventilating Blower to the Turret Bulge.

a. Authority: Letter AGF, File 470.8, dated 17 July 1944, GNRQT-6/91272.

b. Purpose: To determine the suitability of relocating the 1000 cfm ventilating fan in the turret bulge.

2. DISCUSSION:

Limitations have been imposed on the Heavy Tank, M26 by the adoption of the present location of the 1000 cfm tank ventilating blower in the bow. Among these are: ballistically weakened front plate, vision obstruction for the driver and bog, vulnerability to mud, rain, snow, water splash from fording, excessive noise, and direct air blast on bow crew members. Investigation of other possible positions indicated that a blower of similar size and capacity could be installed at the rear of the turret bulge. The details of tests to determine the suitability of relocating the blower are contained in the Appendix.

3. CONCLUSIONS:

a. Relocation of the 1000 cfm axial flow tank ventilating blower to the turret bulge position will provide:

(1) Adequate gun fume removal from the fighting compartment.

(2) High but tolerable dust conditions within the fighting compartment provided fenders and sand shields remain on vehicle and provided vehicle does not follow closely behind another vehicle on a heavy dust-covered terrain.

(3) Reduced air blast on crew members.

b. Blower will not provide satisfactory air movement to remove moisture and heat from bow compartment when vehicle is buttoned up in hot, humid climates.

c. Blower noise level is excessive when tank is stationary and engine is idling or not operating. Blower noise level, when blower is covered by discharge duct system, is annoying but still below that of the tank noise level when the vehicle is in operation. With the discharge duct removed noise level is excessive.

d. A potential carbon monoxide hazard results from the proximity of the turret bulge blower armored intake to the auxiliary generator engine exhaust outlet.

e. Power consumption is high, but no greater than the power consumption of the bow blower.

f. That, with regard to factors tested, the turret bulge location of the 1000 cfm blower is as satisfactory as the present bow location.

4. RECOMMENDATIONS:

a. That if the 1000 cfm tank ventilating blower is relocated to the turret bulge position in future production M26 tanks:

(1) A recirculating fan be located in the bow for additional air movement.

(2) An improved armored intake be designed and produced to give reduced resistance to air flow, either by the addition of turning vanes, improved air flow turns, or both.

(3) An improved discharge duct be designed to provide minimum resistance to airflow.

(4) Development be continued on a dust filter to reduce the dust concentration in the vehicle fighting compartment.

(5) Development be instigated to reduce the noise level of the axial flow blower.

(6) Adequate diversion of the auxiliary generator exhaust gases be accomplished to prevent entry into the fighting compartment.

NOTE:
Concurred in by Armored Board and Hqs. Armored Center with following additional recommendations:

That the 1000 cfm blower be relocated to the turret bulge in the Heavy Tank, M26, at the earliest possible date.

If the 1000 cfm blower is to be retained in the Heavy Tanks, T29 and T30, recommend consideration be given to relocation of these blowers for the same reasons set forth in Paragraph 2 of the attached report.

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3 Incls.
#1 - Appendix w/table 2
#2 - Tables 1,3,4,5,6
#3 - Figures 1 - 4

APPENDIX

The following tests were conducted to determine the suitability of relocating the 1000 cfm axial flow tank ventilating blower from present production location in the bow to a new, proposed position, mounted horizontally, at the rear of the turret bulge. The desirability of the relocation is a result of limitations imposed by the location of present blower equipment; namely, vision obstruction for the driver and bog due to the elevation of the armored air intake; ballistic weakening of the casting; vulnerability as to the pickup of mud, rain, snow, and water splash from fording; excessive noise at the ear level of bow crew members; and direct high velocity air blast on the driver and bog.

Tests have been conducted on the turret and bow blowers which permit comparison with regard to air flow quantities, dust, noise, power, and gun fume removal. Details are listed below.

The subject blower is the axial flow type, manufactured by American Air Filter Company, Louisville, Kentucky, designed to produce 1000 cfm at a minimum voltage of 24 volts against 1.4 inches static positive pressure plus the resistance of the bow armored air intake. The standard blower housing was reduced in length to 7-7/8", placed in a triangular frame and mounted in the turret bulge in a horizontal plane. See Figure 4. For test purposes a box was constructed to surround the blower, diverting the air flow downward and through a duct built approximately one (1) inch above the casting floor, the full width of the bulge, channeling the air forward. On the bulge exterior there was a wooden mockup of an armored intake, directing the air vertically up to the blower.

The bow blower is of the same type, a pilot model for present production blowers, designed to supply the same volume flow as the turret blower under identical conditions.

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PROCEDURE:

Air volume flow measurements were made on the turret bulge blower to determine its capacity under varying conditions and as a comparison with the bow blower.

To measure the air volume of the turret blower the armored inlet was removed and replaced by an 18 foot length of ten (10) inch diameter straight pipe, the center of which contained a six (6) inch diameter sharp edge orifice with proper pressure take-off nipples. A water U-gauge was attached to the nipples to measure the pressure drop across the orifice, which in turn was calibrated for air flow, using the equation:

$$Q = \frac{3820 \times C \times D_2^2}{\sqrt{1 - R^4}} \times \sqrt{Th/b}$$

where Q = Air volume, cfm
C = Orifice coefficient, = 0.61
$R = D_2/D_1$
D_1 = Pipe diameter, ft.
D_2 = Orifice diameter, ft.
T = Air temperature, °F, Abs
h = Pressure drop, inches H_2O
b = Barometric pressure, mm. Hg.

The tank static pressure was measured with a U-gauge.

By controlling the intake area of the pipe, various air volumes were obtained. This was done for a variety of conditions; i.e., tank open, tank closed breech open, tank closed breech closed, etc. In this way air flow versus tank positive static pressure measurements were secured.

These data were plotted on double logarithmic graph paper yielding a straight line curve. The inlet pipe and orifice were then replaced by the armored inlet and a tank static pressure measurement was made and plotted on the same curve. The corresponding approximate air flow was thus determined for this condition.

The air flow from the bow blower was determined in a similar manner. The conditions measured were tank open and closed, blower discharge duct installed and removed, breech open and closed. The data are illustrated in Table 1.

Power input was calculated from current and voltage measured at the supply line near the turret blower switch. A calibrated stroboscope was used for measuring the blower speed. Several conditions were measured which are also listed on Table 1.

Pressure loss due to the resistance of the armored inlet and the discharge duct system were measured (see Fig. 4) to illustrate the cost of reduced air flow

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with the restricted discharge. These data are given in Table 2.

Using a thermal-anemometer, air movement measurements were taken at the head-shoulder, waist, and ankle-leg location for each of the three number positions under different tank conditions. The data are presented in Table 3.

RESULTS:

Measurements of air volume flow conditions with the turret-to-gun blower and the discharge duct in place indicate a reduction in quantity below that of a free discharge. This is to be expected due to the air direction change and restriction with resulting pressure loss. The air flow under these conditions, however, can be increased by an improved duct system design.

TABLE 2

PRESSURE LOSS MEASUREMENTS OF TURRET ARMORED INLET AND BLOWER DISCHARGE DUCT

POSITION MEASURED (See Figure 4 for location)	STATIC PRESSURE INCHES H_2O	
	Tank Open	Tank Buttoned Up
P_1 - Armored Inlet	0.55"	0.30"
P_2 - Side of Blower Box Enclosure	1.57"	1.34"
P_3 - Flat Exhaust Duct Near Box	0.67"	0.51"
P_4 - Flat Exhaust Duct Near Opening	0.55"	0.27"
$P_1 + P_2$ - Blower Equipment Resistance	2.12"	1.64"

In spite of the airflow reduction the tank positive pressure is adequate for gun fume removal.

Power requirements are high but are to be expected for this air flow usually delivered with a small blower operating against these pressures. Reduction in power input can be secured only by an increase in the blower size; this is difficult because of the space limitation.

Air movement in the tank, particularly when the turret is powered for traveling, is too low. Some additional means of air movement are required for maintaining the efficiency of the crew members in the hot operation or hot, humid climates. This may be accomplished by increasing the capacity of the present hot-water heater fan with additional vanes or by the addition of one or more efficient propeller-type fans. The conditions in the turret are satisfactory, and the location of the air discharge at knee level, rather than on the shoulders, as with the present bow fan, is particularly desirable for cold weather operation.

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PROCEDURE:

Gun fume trials were run on a T25E1 tank (hull and turret conditions similar to M-26) blower of nominal 1000 cfm capacity, and with the proposed turret fan of nominal 1000 cfm capacity. Data were collected on three days (3, 4, and 6 July 1945).

CO concentrations were determined simultaneously by the N.D.R.C. Infra-red Gas Analyzer and the M.S.A. CO Indicator. Since virtually identical results were secured by the two methods only the N.D.R.C. Gas Analyzer results are reported.

The turret was sampled at the loader's position, and the bow was sampled at the assistant driver's position. Sampling time was five minutes for each 5 rounds of 90 mm ammunition or each 250 rounds (1 belt) of .30 cal. machine gun ammunition. Zero test time was the time of firing the first round in either case. When several bursts or belts were fired they were fired at 5 minute intervals.

Since the intake for the turret fan is very close to the auxiliary engine exhaust outlets, tests were run to determine CO pickup from those sources while no gun was fired.

To produce more severe conditions, the M-1 muzzle plug was used in several of the tests on both the bow and the coaxial machine gun. The M-1 muzzle plug gave higher CO concentrations than the C.W.S. muzzle plug in previous tests (Armored Medical Research Laboratory, Final Report on Project No. 44 - The Physiological and Operational Characteristics of M-24 Tank, dated 5 November 1944). Since the air stream from the turret blower is directed toward the bow when the turret is in firing position, one test was run while the turret was in traveling position during firing of the bow machine gun. On all other tests the turret was in firing position. Static pressure in the turret was measured by means of an Alnor Velometer. Test conditions and results are shown in Table 4.

RESULTS:

When the turret blower was used while running the main or auxiliary engine, no carbon monoxide was detected (see Table 4). However, there was a strong exhaust fume odor in the turret while running the auxiliary generator and it is to be anticipated that, with poorly adjusted motor and/or adverse wind conditions, a CO hazard will develop from this source.

As shown by the data in Table 4, the CO concentrations were satisfactorily low (0.05% permissible for one-half hour) using the turret fan while firing the 90 mm rifle, the coaxial .30 cal. machine gun, and the .30 cal. bow machine gun. No significant increase in CO concentration was noted in the bow while firing the bow machine gun with the turret in the traveling position, using the turret blower.

The bow fan gave satisfactorily low results on all except one test in which the turret was sampled while firing the .30 cal. coaxial machine gun with the M-1 muzzle plug. This confirms previous tests (Armored Medical Research Laboratory, First Partial Report on Project No. 41 - Physiological Characteristics of the T25E1-T26E1 Tank. Subject: Control of Gun Fume Hazard, dated 19 July 1944).

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The proposed turret blower is as satisfactory for the removal of gun fumes from the turret and bow of the tank as is the bow blower, and according to the standards of this Laboratory, is acceptable from the standpoint of gun fume removal.

PROCEDURE:

Dust concentrations were measured under varying conditions with comparisons being made between the bow and turret bulge blower under approximately similar dust conditions. Dust was sampled with an I.E.S.A. midget impinger apparatus at both a bow position (bog) and in the turret (loader) at the breathing level.

A driving course 0.90 miles long was laid out over an unvegitated clay terrain with reference to the prevailing wind to allow a maximum of driving up or down wind. The dust condition of the course would be considered severe in terms of normal tank operation.

Tests were broken into two groups, (a) test vehicle operating 15-20 yards behind a leading M26 Heavy tank and (b) test vehicle operating alone. Test speeds were 5-10 mph. In test (b) sand shields alone then, in addition to front fenders were removed to measure their benefit on dust reduction. Average wind velocity measurements were made during the above tests.

Moving pictures and still photographs were taken of an M26 Heavy tank with and without fenders and sand shields to observe the dust pattern about the hull and turret.

RESULTS:

Dust concentrations in all positions measured in tests (a) were excessive, more so with the turret bulge blower than with the bow blower (see Table 5). In comparative tests, with the gun in rear or forward positions, the bow location was the more satisfactory of the two inlet positions. During these tests the wind velocity was 5-10 mph. In actual practice it is doubtful if vehicles could travel so closely behind one another for safety reasons and because of the danger of clogging the engine oil filter.

Tests 5A and 5B in group (b) were repeated on the second day of test operation when a lower wind velocity prevailed. The first test serves to illustrate the condition arising with a strong wind blowing over an extremely dusty terrain. Tests 5A through 7B made on 12 July show entirely satisfactory conditions with the turret bulge blower equivalent to the bow blower. Removing the sand shield and front fenders increases the dust concentration in the vehicle from 4 to 10 times the value for the same positions with the shields and fenders installed. This is an excellent illustration for the requirement of sand shields and fenders, durable enough to remain intact through the hazards of normal tank employment.

Figures 2 through 3 attempt to show the dust pattern about the moving vehicle for a variety of conditions. These include movement in opposite directions, fenders and sand shields installed, sand shields only removed, front fenders and sand shields removed. Visual observation, substantiated by motion pictures taken from a 30 foot

height looking angularly down, show the dust pattern of the moving vehicle to be heavier at the engine air intake than at the bow. This is partially due to the negative pressure created at that point of air intake and partially because of air pattern of the moving vehicle. In any event the turret bulge blower intake is more apt to be vulnerable to a dusty atmosphere than the bow blower intake.

With either blower operating there is a definite requirement for an adequate dust filter.

PROCEDURE:

Noise level measurements were made at ear level of all crew positions, [illegible] at the face of a simulator radio in the test vehicle with the turret bulge blower on and off, under a series of conditions, moving and stationary. Measurements were also made for comparison on the bow blower.

A General Radio Company Sound Level Meter No. 759 with a microphone extension was used for obtaining the noise level values. The mean value shown in Table 4 for the noise level represents the average of several readings varying over a range of approximately 5 Db.

RESULTS:

Noise level intensity of the blowers operating without baffling is objectionably high (see Tab. 6), particularly because of the high frequency sound range. With earphones the noise is tolerable although extremely unpleasant. The influence of enclosing the turret bulge blower with the discharge duct system is to lower the intensity 11-15 Db. The noise level of the enclosed turret blower is exceeded only by the noise of the vehicle operating on a concrete road at 10 mph. Even in those situations where the tank noises are of greater intensity than the blower, the higher frequency of the latter still adds to the confusing din for the tank crew members.

A serious effort should be made to reduce the noise level of tank ventilating blowers.

TABLE 1

AIR VOLUME, TANK S.P., POWER, SPEED MEASUREMENTS

BLOWER	AUXILIARY GENERATOR	TURRET HATCHES	BOW HATCHES	BLOWER DISCHARGE RESTRICTION	BLOWER INLET RESTRICTION	GUN BREECH	Δ P ORIFICE PRESSURE DROP IN. H_2O	AIR VOLUME CFM	TANK S.P. IN. H_2O	AMPS.	VOLTS	WATTS INPUT	BLOWER RPM
Turret	On	Closed	Closed	DISCHARGE DUCTS	Orifice In Duct	CLOSED	2.45	880	1.26	NOT MEASURED			
Turret	On	Closed	Closed		Armored Inlet		-	820	1.30				
Bow	On	Closed	Closed		Block		-	910	1.34				
Turret	On	Open	Open		Orifice In Duct		2.80	860	-				
Turret	On	Closed	Closed	On	Orifice In Duct	OPEN	2.52	820	1.10	NOT MEASURED			
Turret	On	Closed	Closed	On	Armored Inlet		-	860	1.15				
Bow	On	Closed	Closed	-	Block		-	950	1.32				
Turret	On	Closed	Closed	None	Orifice In Duct	CLOSED	2.99	880	1.65	42.0	27.5	1128	6125
Turret	On	Closed	Closed	None	Armored Inlet		-	1020	2.09	20.5	28.4	1193	6200
Turret	On	Open	Open	None	Orifice In Duct		3.85	1000	-	44.5	27.0	1155	6000
Turret	On	Closed	Closed	None	Orifice In Duct	OPEN	3.19	910	1.30				
Turret	On	Closed	Closed	None	Armored Inlet		-	950	1.34	40.0	28.3	1140	6150
Bow	On	Closed	Closed	-			-	990	1.38	NOT MEASURED			
Turret	Off	-	-	-	-	-	-	-	-	0	26.0	-	0
Turret	On	-	-	-	-	-	-	-	-	0	26.0	-	0

NOTES: All tests conducted with auxiliary engine off.

TABLE 3

AIR MOVEMENT IN MEDIUM TANK, T25E1, WITH TEST BLOWER LOCATED IN TURRET BULGE POSITION

AIR MOVEMENT IN FPM AT VARIOUS CREW POSITIONS						
AIR MEASUREMENT POSITION	TEST CONDITION	I GUN IN FORWARD POSITION ALL HATCHES OPEN	II GUN IN FORWARD POSITION BOW HATCHES CLOSED COM'DR HATCH OPEN	III GUN IN FORWARD POSITION ALL HATCHES CLOSED	IV GUN IN REAR POSITION ALL HATCHES CLOSED	V GUN IN REAR POSITION ALL HATCHES OPEN
Legs Waist Shoulders	COM'DR	155 - 160 160 - 180 98 - 120	215 - 240 240 - 265 180 - 195	145 - 160 82 - 90 60 - 70	60 - 67 90 - 98 98 - 105	145 - 155 160 - 170 195 - 205
Legs Waist Shoulders	LOADER	78 - 120 74 - 98 190 - 195	180 - 195 195 - 215 195 - 215	125 - 132 74 - 82 67 - 82	255 - 265 160 - 170 140 - 145	180 - 190 140 - 145 120 - 145
Legs Waist Shoulders	GUNNER	132 - 145 90 - 98 140 - 155	180 - 195 265 - 290 215 - 240	110 - 132 155 - 180 132 - 145	115 - 120 115 - 132 70 - 82	120 - 125 170 - 180 160 - 170
Legs Waist Shoulders	BOW	82 - 88 82 - 110 240 - 265	45 - 50 98 - 110 160 - 180	37 - 45 74 - 82 60 - 67	17 - 20 45 - 50 70 - 82	37 - 41 45 - 47 132 - 140
Legs Waist Shoulders	DRIVER	110 - 132 160 - 180 195 - 215	145 - 160 240 - 265 240 - 265	74 - 86 190 - 205 180 - 195	37 - 47 50 - 60 37 - 47	31 - 43 70 - 74 90 - 95

TABLE 4

GUN FUME REMOVAL DATA

GFT TEST NO.	MUZZLE PLUG	BURSTS ON BELTS	TOTAL ROUNDS FIRED	OPEN HATCHES	MAIN ENGINE	AUXILIARY ENGINE	BLOWER USED	POSITION SAMPLED	STATIC PRESSURE IN TURRET WITH BLOWER CLOSED (in. H_2O)	AVERAGE CO CONCENTRATION %
NO FIRING										
1A	-	0	0	None	Off	On	Turret	Turret	0.70	.000
2A	-	0	0	"	On	Off	"	"	0.73	.000
FIRING 90 MM RIFLE										
5A	-	2	9	None	Off	On	Turret	Turret	0.50	.031
6A	-	2	8	Comm.	"	Off	"	"	0.02	.028
8A	-	2	10	"	"	On	"	"	0.02	.032
9A	-	2	10	"	"	"	"	Bow	0.01	.022
7A	-	2	10	None	"	"	Bow	Turret	1.55	.023
3A	-	2	10	Comm.	"	"	"	"	0.03	.007
FIRING .30 CAL. BOW MACHINE GUN										
8A	.712	2	500	Loader & Comm.	Off	On	Turret	Bow	0.01	.009
2B	M-1	2	500	None	"	"	"	"	-	.001
1B	M-1	2	500	Comm.	"	"	"	"	0.02	.014
1B*	M-1	2	500	"	"	"	"	"	-	.000
FIRING .30 CAL. COAXIAL MACHINE GUN										
5C	.712	2	500	Comm.	Off	On	Turret	Turret	0.01	.010
4C	M-1	1	250	None	"	"	"	"	0.90	.000
3C	M-1	2	500	Comm.	"	"	"	"	0.01	.000
7C	M-1	1	250	"	"	"	Bow	"	0.01	.014

* Turret in travelling position on this test only.

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TABLE 5

COMPARATIVE TESTS, BOW BLOWER VERSUS TURRET BLOWER

Test No.	Hatches: Driver	Hatches: Gunner	Blower Location	Gun Position	Periscope and Gun Sighting	Crew Position Sacrificed	Time of Operation	Ave. Wind Velocity MPH	Dust Conc. Million Part. per Cu. Ft.
Test Vehicle Operating [illegible] Tank - (a)									
1A	Open	Open	Turret	Rear	On	Loader	7'49"	7.8	153.5
1B	Open	Open	Turret	Rear	On	Bog	7'29"	8.4	368.0
2A	Open	Open	Bow	Rear	On	Loader	7'29"	6.6	136.4
2B	Open	Open	Bow	Rear	On	Bog	7'26"	9.6	185.9
3A	Open	Open	Turret	Forward	On	Loader	7'30"	7.8	274.0
3B	Open	Open	Turret	Forward	On	Bog	7'56"	7.2	142.0
Test Vehicle Operating Alone - (b)									
5A*	Closed	Closed	Turret	Forward	On	Loader	7'05"	7.8	352.00
5B*	Closed	Closed	Turret	Forward	On	Bog	7'20"	8.4	284.00
5A	Closed	Closed	Turret	Forward	On	Loader	7'25"	1.2	32.40
5B	Closed	Closed	Turret	Forward	On	Bog	7'47"	3.4	38.60
6A	Closed	Closed	Bow	Forward	On	Loader	6'25"	Trace	22.20
6B	Closed	Closed	Bow	Forward	On	Bog	8'25"	2.4	74.00
7A	Closed	Closed	Turret	Rear	On	Loader	7'15"	0.6	23.80
7B	Closed	Closed	Turret	Rear	On	Bog	8'00"	5.4	30.95
9A	Closed	Closed	Turret	Forward	Off	Loader	6'24"	1.8	187.00
9B	Closed	Closed	Turret	Forward	Off	Bog	7'30"	4.2	159.00
10A	Closed	Closed	Bow	Forward	Off	Loader	8'34"	3.0	216.00
10B	Closed	Closed	Bow	Forward	Off	Bog	8'32"	4.2	343.50
11A	Closed	Closed	Turret	Rear	Off	Loader	8'09"	1.8	71.00
11B	Closed	Closed	Turret	Rear	Off	Bog	9'01"	1.2	36.60

* Tests conducted with Group 1A-3B on 10 July 1945
Others conducted on 12 July 1945

TABLE 6

MEAN NOISE LEVEL MEASUREMENTS, Db., OF MEDIUM TANK T-25E1
WITH 1000 CFM TEST BLOWER LOCATED IN TURRET BULGE

	TEST CONDITIONS											
TEST NUMBER	STATIONARY							MOVING				
Remarks	1	2	3	4	5	6	7	8	9	10	11	12
Stationary tests conducted in open space. All tests conducted with gun in forward position. Noise level measurements made with General Radio Co. Sound Level Meter No. 759 with microphone extension. All noise level values are mean for a 5 decibel range. Tank buttoned up in all tests unless otherwise indicated.	BLOWER ON AUXILIARY GENERATOR ON TANK ENGINE OFF	BLOWER OFF AUXILIARY GENERATOR ON TANK ENGINE OFF	BLOWER ON AUXILIARY GENERATOR ON--TANK ENGINE OFF--DISCHARGE DUCT OFF	BOW BLOWER ON AUXILIARY GENERATOR ON	BLOWER ON AUXILIARY GENERATOR ON--TANK ENGINE OPERATING AT IDLING SPEED (900 RPM)	BLOWER OFF AUXILIARY GENERATOR ON--TANK ENGINE OPERATING AT IDLING SPEED (900 RPM)	BLOWER ON AUXILIARY GENERATOR OFF TANK ENGINE OFF	BLOWER ON AUXILIARY GENERATOR ON--VEHICLE MOVING 10 MPH ON CONCRETE RD.--ENGINE SPEED 2100--DRIVER'S HATCH OPEN	BLOWER OFF AUXILIARY GENERATOR ON--VEHICLE MOVING 10 MPH ON CONCRETE RD.--ENGINE SPEED 2100--DRIVER'S HATCH OPEN	BLOWER ON AUXILIARY GENERATOR ON--VEHICLE MOVING 10 MPH ON DIRT RD.--ENGINE SPEED 2100--DRIVER'S HATCH OPEN	BLOWER OFF AUXILIARY GENERATOR ON--VEHICLE MOVING 10 MPH ON DIRT RD.--ENGINE SPEED 2100--DRIVER'S HATCH OPEN	BLOWER OFF AUXILIARY GENERATOR ON--VEHICLE MOVING 10 MPH ON CONCRETE RD.--ENGINE SPEED 2100 RPM.--DRIVER, COMMANDER HATCH OPEN
LISTENING POSITION												
At Radio Face	83	84	97	81	72	83	88	93	94	83	80	105
Commander Ear Level	82	66	97	81	61	81	91	93	93	84	79	105
Loader Ear Level	84	83	98	82	69	83	90	93	94	82	80	97
Gunner Ear Level	86	63	96	83	70	84	87	93	93	84	81	97
Driver Ear Level	78	63	91	72	68	75	93	93	94	80	81	100
Bog Ear Level	76	63	91	73	68	73	93	93	94	80	81	97

Dust Pattern for Heavy Tank, M26
with Fenders and Sand Shields
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Figure 1, Project No. 45 FORT KNOX, KY. July, 1945

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Dust Pattern for Heavy Tank, M26
with Fenders without Sand Shields

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Figure 2, Project No. 45 FORT KNOX, KY. July, 1945

Incl. #3

Dust Pattern for Heavy Tank, M26
without Front Fenders and Sand Shields
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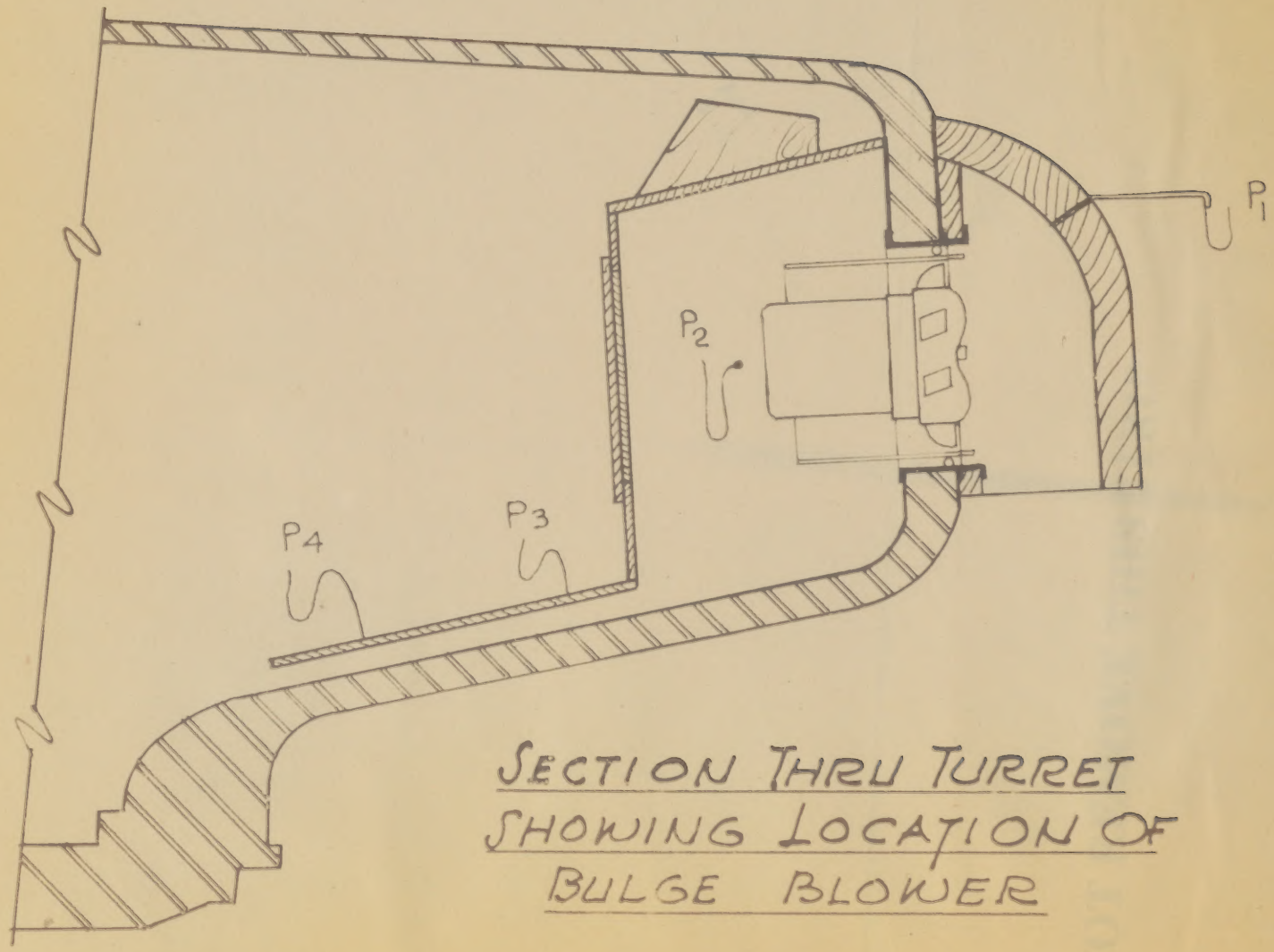
Figure 3, Project No. 45 FORT KNOX, KY. July, 1945

Incl. #3

Sheet #3



SECTION THRU TURRET
SHOWING LOCATION OF
BULGE BLOWER

FIG. 4

FIG. 4

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